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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

JONES, HUGH M

ART UNIT PAPER NUMBER

2128

DATE MAILED: 04/05/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/071,857

Applicant(s)

ORTIZ ET AL.

Examiner

Hugh Jones

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 January 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 August 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-7 of U. S. Application 10/071,857, filed 02/06/2002 are presented for examination.

Priority

2. Applicant's claim for domestic priority under 35 U.S.C. 119(e) is acknowledged. However, the provisional application upon which priority is claimed fails to provide adequate support under 35 U.S.C. 112 for claims 1-7 of this application. The non-provisional document is replete with disclosure (mathematical equations, for example) that are not disclosed in the provisional document. Specifically, there is no support for determining the dynamics, calculating the contact forces, triangulating the geometry, Newmark's explicit time stepping algorithm, predicting an unconstrained configuration, penalty parameters, and applying irreversible cohesive laws. In fact, there are a mere five or six lines (page 2) in the provisional application which disclose generalities about simulation of head injuries. Priority is not granted.

Drawings

3. Figures 1-6, 8-9 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the

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applicant will be notified and informed of any required corrective action in the next Office action. For example, see figure 1-2 of Ortiz et al. (of record). The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 1-7 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

6. Specifically, there is no enabling teaching of determining the angle of entrance/exit of projectile in the specification.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. **Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ortiz et al. (one of the inventors) in view of Bandak et al. (abstract).**

10. Ortiz et al. disclose

A method for simulating the impact of a projectile with a solid, comprising:

determining the dynamics of said projectile and said solid, including the angle of entrance and exit of said projectile (section 4 – “simulation of the drop-weight dynamic fracture test”; note fig. 1 and corresponding text);

calculating the contact forces through time of said projectile and said solid (section 4 – “simulation of the drop-weight dynamic fracture test); and

calculating the fragmentation of said solid (section 4 – “simulation of the drop-weight dynamic fracture test).

the method of claim 1, wherein the step of determining the dynamics is comprised of the steps of:

triangulating the geometry of said projectile with respect to said solid (section 4 – “simulation of the drop-weight dynamic fracture test); and

describing the properties of said projectile and said solid (section 4 – “simulation of the drop-weight dynamic fracture test).

the method of claim 2, wherein the step of calculating the contact forces further comprises the use of nonsmooth contact analysis (section 4 – “simulation of the drop-weight dynamic fracture test).

the method of claim 3, wherein the step of calculating the contact forces further comprises the use of Newmark's explicit time stepping algorithm is to calculate contact forces in discrete time steps (section 4 – “simulation of the drop-weight dynamic fracture test – especially pg. 1277).

the method of claim 4, wherein the implementation of Newmark's explicit time stepping algorithm is comprised of the steps of

predicting an unconstrained configuration that identifies violated constraints (section 4 – “simulation of the drop-weight dynamic fracture test); and

returning the closest-point-projection of the predictor configuration onto an admissible set (section 4 – “simulation of the drop-weight dynamic fracture test).

the method of claim 5, wherein the implementation of Newmark's explicit time stepping algorithm further comprises the adoption of a penalty parameter in the predicting step (section 4 – “simulation of the drop-weight dynamic fracture test – especially pg. 1277).

the method of claim 6, wherein the step of calculating the fragmentation of said solid further comprises:

applying an irreversible cohesive law to said solid (section 4 – “simulation of the drop-weight dynamic fracture test);

applying an irreversible cohesive law to cracks in said solid as said cracks develop (section 4 – “simulation of the drop-weight dynamic fracture test); and

applying an irreversible cohesive law to solid fragments as said fragments develop (section 4 – “simulation of the drop-weight dynamic fracture test).

11. Ortiz et al. do not expressly disclose the application of their finite element study of fracture of solids to skulls or bones, which are solids.

12. Bandak et al. disclose the use of finite element study to skull fracture (abstract).

13. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the Ortiz et al. disclose with the Bandak et al. disclosure because Banda et al. disclose that finite element models can be used to study skull fracture.

14. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kane et al. (including one of the inventors) in view of Pandolfi et al. (including one of the inventors) and in further view Bandak et al. (abstract).

15. Kane et al. disclose the limitations as subsequently indicated including non-smooth contact algorithms.

16. Kane et al. do not appear to disclose nucleation and propagation of fractures.

17. Pandolfi et al. disclose solid modeling aspects of three-dimensional fragmentation, including nucleation and propagation of fractures modeled by use of a self-adaptive fragmentation procedure.

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18. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the Kane et al. disclosure with the Pandolfi et al. disclosure because Kane et al. disclose that their work has application to fragmentation (abstract).

19. Furthermore, Kane et al. do not expressly disclose the application of their study of fracture of solids to skulls or bones, which are solids.

20. Bandak et al. disclose the use of finite element study to skull fracture.

21. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the Kane et al. disclosure with the Bandak et al. disclosure because Bandak et al. disclose that finite element models can be used to study skull fracture.

22. Specifically, the art discloses:

A method for simulating the impact of a projectile with a solid, comprising:

determining the dynamics of said projectile and said solid, including the angle of entrance and exit of said projectile (K: section 1, section 3.5 [contact algorithm], fig. 18-19; P: sections 4, 6, fig. 27-28; B: abstract);

calculating the contact forces through time of said projectile and said solid (K: section 1, section 3.5 [contact algorithm], fig. 18-19; P: sections 4, 6; B: abstract); and

calculating the fragmentation of said solid (K: section 1, section 3.5 [contact algorithm], fig. 18-19; P: sections 4, 6, fig. 27-28; B: abstract).

the method of claim 1, wherein the step of determining the dynamics is comprised of the steps of:

triangulating the geometry of said projectile with respect to said solid (K: section 1, section 3.5 [contact algorithm], fig. 18-19; P: sections 4, 6; B: abstract); and

describing the properties of said projectile and said solid (K: section 1, section 3.5 [contact algorithm], fig. 18-19; P: sections 4, 6; B: abstract).

the method of claim 2, wherein the step of calculating the contact forces further comprises the use of nonsmooth contact analysis (K: title, section 1, section 3.2 [time discretization], section 3.5 [contact algorithm], fig. 18-19; P: sections 4, 6; B: abstract).

the method of claim 3, wherein the step of calculating the contact forces further comprises the use of Newmark's explicit time stepping algorithm is to calculate contact forces in discrete time steps (K: section 1, section 3.2 [time discretization], section 3.5 [contact algorithm], fig. 18-19; P: sections 4, 6; B: abstract).

the method of claim 4, wherein the implementation of Newmark's explicit time stepping algorithm is comprised of the steps of

predicting an unconstrained configuration that identifies violated constraints (K: section 3.2 [time discretization], section 3.5 [contact algorithm], section 3.7 [Geometric Structure], fig. 4; P: sections 4, 6; B: abstract); and

returning the closest-point-projection of the predictor configuration onto an admissible set (K: equation 2.12, section 2, section 3.2 [time discretization], section 3.3 [the admissible set], section 3.5 [contact algorithm], section 3.7 [Geometric Structure], section 5 fig. 4, fig. 9, fig. 11, fig. 13; P: sections 4, 6; B: abstract).

the method of claim 5, wherein the implementation of Newmark's explicit time stepping algorithm further comprises the adoption of a penalty parameter in the

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predicting step (K: section 3.2 [time discretization], section 3.5 [contact algorithm], section 3.7 [Geometric Structure], fig. 4; P: sections 4, 6; B: abstract).

the method of claim 6, wherein the step of calculating the fragmentation of said solid further comprises:

applying an irreversible cohesive law to said solid (K: abstract, section 1, section 3.5 [contact algorithm], section 3.7 [Geometric Structure], fig. 4; P: sections 4, 6, fig. 27-28; B: abstract);

applying an irreversible cohesive law to cracks in said solid as said cracks develop (K: abstract, section 1, section 3.5 [contact algorithm], section 3.7 [Geometric Structure], fig. 4; P: sections 4, 6; B: abstract); and

applying an irreversible cohesive law to solid fragments as said fragments develop (K: abstract, section 1, section 3.5 [contact algorithm], section 3.7 [Geometric Structure], fig. 4; P: sections 4, 6, fig. 27-28; B: abstract).

Response to Arguments

23. Applicant's arguments filed 1/17/2006 have been fully considered but they are not persuasive.

Response to Arguments - Priority

24. The provisional application upon which priority is claimed fails to provide adequate support under 35 U.S.C. 112 for claims 1-7 of this application. The non-provisional document is replete with disclosure (mathematical equations, for example) which are not disclosed in the provisional document. Applicants have only stated, "The

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mere fact that the non-provisional application provides further detail is not the test for enablement under 35 USC 112." In and of itself, that mere fact is insufficient. Such commentary was provided in order to point out to Applicants the many discrepancies between the two specifications. In this case, as stated in the last office action, the provisional application upon which priority is claimed *fails to provide adequate support under 35 U.S.C. 112* for *claims 1-7* of this application. Applicants have made no attempt to provide a showing of support for the claimed invention in the provisional application. The Examiner, respectfully can not find support for the claimed invention in the provisional application.

25. The non-provisional document is replete with disclosure (mathematical equations, for example) that are not disclosed in the provisional document. Specifically, there is no support for determining the dynamics, calculating the contact forces, triangulating the geometry, Newmark's explicit time stepping algorithm, predicting an unconstrained configuration, penalty parameters, and applying irreversible cohesive laws. In fact, there are a mere five or six lines (page 2) in the provisional application which disclose generalities about simulation of head injuries.

26. Therefore, priority to the provisional application is not granted. A specific showing of support for the *claimed* invention, in the provisional application is required before priority will be granted.

Response to Arguments - Inventorship

27. The objection is withdrawn in view of Applicant's reference to the declaration.

Response to Arguments – Prior Art Rejections

28. Applicant's arguments are not persuasive. In response to Applicant's arguments, it is noted that Ortiz et al. disclose entrance and exit calculations (fig. 1 and corresponding text). Ortiz et al. disclose simulation of drop weight dynamic fracture tests – impulse loading of a surface (see fig. 10, for example), thereby causing the crack, and time dependent (dynamic – see also plate 3 and fig. 10). It addresses the dynamics/entrance/exit features in at least as much detail as the instant specification.

Conclusion

29. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- Mota et al. Finite element simulation of firearm injury to the human cranium.

Note col. 2 of page 116, especially the second and third full paragraphs.

30. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

31. A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

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extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

32. Any inquiry concerning this communication or earlier communications from the examiner should be:

directed to: Dr. Hugh Jones telephone number (571) 272-3781,

Monday-Thursday 0830 to 0700 ET,

or

the examiner's supervisor, Kamini Shah, telephone number (571) 272-2279.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist, telephone number (703) 305-3900.

mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:


(703) 308-9051 (for formal communications intended for entry)

or (703) 308-1396 (for informal or draft communications, please label *PROPOSED* or *DRAFT*).

Dr. Hugh Jones

Primary Patent Examiner

March 30, 2006


HUGH JONES Ph.D.
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TECHNOLOGY CENTER 2100